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ORIGINAL ARTICLES.

FATAL HÆMORRHAGE FROM THE CONJUNCTIVA
IN THE NEW-BORN, WITH REPORT OF CASE.

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SPONTANEOUS fatal hæmorrhage from the conjunctiva, with death due directly to the hæmorrhage itself, is extremely rare; so much so, that in a most careful search through the literature, I have been able to find but two cases besides the one which I report to-night.

One is that reported by Dr. Friederich Mueller, from the clinic of Prof. Gusserow. He calls it "Hæmophilia Congenita" or "Tödliche Blutung aus den Augenbindehäuten." This case was almost identical with my own.

The other is that reported by Abbé in the *American Journal of Ophthalmology*, January, 1899.

Hansell of Philadelphia reported a case of hæmorrhage in an infant, but this baby died more than a week after the hæmorrhage had been checked.

Jessop reports five cases of severe hæmorrhage—three of which recovered. But all of these cases were due to some anatomical change such as nævus, granulations, etc.

Sharkey reported a fatal hæmorrhage which resulted from scarification of the lids.

Nettleship in his text book mentions a case of hæmorrhage following ophthalmia neonatorum, but does not say that it was fatal.

Stoewer reports a case of severe hæmorrhage in a child of six months, where bleeding was constant during the day time, but stopped when the child was asleep. The source was found to be a small sessile growth in the middle of the upper lid of the left eye. When this was removed and curetted, the hæmorrhage ceased, but the child died two days later.

Pomeroy reports a case of well-nigh fatal hæmorrhage from the conjunctiva, which continued for two days and was stopped by a compression bandage.

The hæmorrhage in four of these cases followed the use of nitrate of silver. In none of them, however, was it used as recommended by the best authorities to-day, i. e., the instillation of one drop of a 1 per cent. solution in each eye. Crédé originally advised one drop of a 2 per cent. solution.

Pomeroy's case started about ten hours after the instillation of two drops of a 2 per cent. solution of nitrate of silver, which was neutralized, however, by a salt solution dropped into the conjunctival sac from a spoon.

De Schweinitz's case followed the use of, first, a 2 per cent. and then a 4 per cent. solution of nitrate of silver.

In Abbé's case a 6 per cent. solution was used instead of a 2 per cent.

In Mueller's case one drop of a 1 per cent. solution was instilled and as gonorrhœa was suspected, an additional drop was instilled that same evening.

In my case 2 gtts of a 2 per cent. solution were used.

The history of the case which I have to report is as follows:

The mother, 22 years of age, had a number of chancroids on the labia and near the urethral opening. She had a purulent discharge in which the gonococcus was found. There was no history of hæmophilia on the side of either the mother or father, so far as could be ascertained. Pains commenced on the night of September 8th, 1902, and the child was delivered on September 9th at 4 a. m. Two drops of a 2 per cent. solution of nitrate of silver were instilled into each eye immediately after confinement. On the following morning

the eyelids, face and pillow were covered with blood. The bleeding had first been noticed at about 5 o'clock a. m.

I first saw the case that afternoon at about 2 o'clock. I found the lids and face again covered with blood, as well as the pillow on which the head rested. The face was washed and the fresh clots were removed. The palpebral conjunctiva was covered with a white membrane, which seemed to be a slough of the epithelium and which later disappeared. Several drops of a 1 to 3,000 solution of adrenalin chloride were instilled into each eye with very little if any effect. These drops were ordered continued every three hours and also ice water applications for ten minutes at a time every hour.

Next morning the slow persistent oozing was still present. A 1 to 1000 solution of adrenalin was now used, several drops being instilled at intervals of about two minutes, until 3 or 4 drops had been used in either eye.

The hæmorrhage from the right eye seemed to be about stopped and that from the left nearly so. A tight compression bandage was now applied. The next morning the bandage as well as the pillow on which the child lay was soaked with blood, at about 3 a. m. The blood was of a paler color but still clotted readily. The clots were now well removed from the conjunctival sac and a careful inspection was made. The lids were not swollen neither was the conjunctiva—the latter was slightly red and an oozing was evident, which could not be traced to any particular point but seemed to come from the entire surface. No ulceration or abrasion could be seen. Adrenalin chloride was again used; the lids were everted and rubbed with stick alum, but with no effect. Pure adrenalin powder was now applied but was washed away like dust. A tight compression bandage which was applied, was on the next day again soaked with blood. All previous efforts were again resorted to and in addition the conjunctival sac was washed out with a solution of gelatin. After this, for the first time, the hæmorrhage seemed to be altogether checked. The tight bandage was reapplied. After this I waited for about half an hour and as I could detect no further oozing under the bandage, I left the patient.

At 2 o'clock the next morning the nurse noticed that the bandage was again stained and by noon the bandage, cheeks

and pillow were again soaked. The blood was much paler but still coagulated readily. All this while the child was taking nourishment nicely and had a strong healthy cry. The mother had plenty of milk.

As the child was now extremely anæmic, a normal salt solution was injected into the rectum. All previous efforts at checking the hæmorrhage were renewed, and an attempt was made to pack the conjunctival sac with gauze, but the blood still oozed through it. Digital compression was then made for about an hour with no success as to stopping the flow of blood.

A piece of cork was now fitted over each eye, wrapped carefully, but not thickly with gauze; and, after approximating these and making tight compression over each eye, a tight bandage was applied regardless of any injury it might do to the head.

From the second day of the treatment at the suggestion of Dr. Justin Steer, the baby was getting, internally, 2 gts of calcium chloride solution (20 grains to 1 ounce) every four hours.

At 9:15 a. m. on September 15th the baby died. A post mortem examination showed the organs to be normal and no internal hæmorrhages. Microscopical examination of a section of the conjunctiva showed nothing abnormal.

The case of Mueller was very similar to this one. Here a 1 per cent. solution of silver nitrate was used at birth, and that same evening as a slight whitish discharge was seen and as gonorrhœa was suspected, a second drop was used. Next day there was a soft clot of blood over the eyelids, which was carefully removed and light-red blood began to ooze slowly from the conjunctival sac, but no swelling or redness of the conjunctiva could be seen. The oozing was general. A tight bandage was applied and the next morning the bandage was soaked. Instillation of chlorine water was now used and the tight bandage reapplied. This bandage, also, soon became soaked and was removed on the third day. Notwithstanding the anæmia the child was still lively and feeding from the breast. On the fourth day the eyes were still bleeding, and in the evening the baby died.

A post-mortem examination showed nothing abnormal.

Mueller questioned whether the nitrate of silver played any part in causing the hæmorrhage. He considered the case as one of hæmophilia, although there was no previous history of such an affection in the family. Abbé, also, doubts whether the silver nitrate caused the hæmorrhage in his case.

To my mind, the silver nitrate was the occasion, but the cause was undoubtedly a predisposition of the child to bleed.

ON THE REMOVAL OF THE EYE-BALL TOGETHER
WITH THE TARSI, CONJUNCTIVAL SAC
AND LID MARGINS.

BY ADOLF ALT, M.D.

AFTER a verbal communication made to the American Ophthalmological Society in 1882, Dr. John Green, in the June, 1884, number of this journal, published an article on "An operation for the removal of the eye-ball, together with the entire conjunctival sac and lid margins," which, as it seems to the writer, has not been appreciated as it should be.

In the modern treatises on the surgery of the eye I can find no reference to it, except in W. Czermak's *Eye Operations* (*Die Augenaerztlichen Operationen*), page 419. He says: "In cases in which the wearing of an artificial eye is *a priori* impossible, because the conjunctival sac is, even if partly only, shrunken, it will be best to attempt to obliterate the whole cavity and to obtain a lasting closure of the palpebral fissure. For, nothing looks more disfiguring than a partially open palpebral fissure, with deeply sunken eyelids, showing an empty cavity. Moreover, the patient is continually annoyed by the flow of tears and conjunctival secretion, the normal removal of which is prohibited by the disarrangement of the drainage apparatus." In a foot-note he refers only to Andrew: On the enucleation of the eye-ball with obliteration of the conjunctival sac (*Brit. Med. Journal*, Dec. 19, 1895). Obviously, the author was not acquainted with the earlier communication of Green, who, in June, 1884, referred to three cases operated upon by himself and to one by the writer.

The method employed by both of us was, after the enucleation of the eye-ball to draw forth the tarsal tissue and conjunctiva by means of forceps, to cut it off from the cutaneous and muscular covering and then to cut off the lid margins. Finally the lid margins are well adapted to each other and carefully stitched. The result is a perfect cutaneous wall, covering the orbit with a barely perceptible linear scar where formerly the palpebral fissure opened.

Czermak recommends to first split the lids into their two parts (tarsus and skin), then to dissect out the retrotarsal folds and peripheral parts of the conjunctival sac, then to enucleate and finally to stitch together the free borders of the lids. (He evidently does not cut off the lid margins). He also states that the eye-ball may first be enucleated and the conjunctival sac dissected out afterwards.

This, of course, may be as the operator chooses.

The point I wish to insist upon is, that there are undoubtedly a large number of cases in which this operation is the very best thing that can be done for the patient. This is especially so in cases of malignant tumors affecting the lid margins and eye-ball, chiefly in cases of epithelioma. But after the removal of certain cases of orbital tumors together with the eye-ball which are not so very apt to recur, as, for instance, tumors of the optic nerve, this operation has its place.

Since first I did it in 1882, together with Dr. J. Green, at the St. Louis Hospital, I have had occasion to perform this operation in seven cases. The result has always been most gratifying to the patient and myself and no relapse has occurred in any of my cases, as far as I know. It may serve excellently well, even when an epithelioma of the lids has been allowed to eat very considerably into the surrounding tissue and into the depth.

The worst case of that kind I operated upon a few years ago with the assistance of Dr. McCandless at St. Mary's Infirmary. The patient, a circuit judge, had consulted me five years previously on account of, what he thought, a wart on the right lower lid margin. My diagnosis of epithelioma, with the necessary prognosis, seemed to convince him that it was best to have it removed at once and the day for the oper-

ation was set. However, when he had returned home his courage had disappeared and he did not come back to be operated upon. On the contrary, he tried all sorts of home and quack remedies, until just five years after his first visit he entered my office again with the words: "Doctor, now you can do with me as you please; you can even cut off my head." The epithelioma had now eaten away both the outer and inner canthi and part of the lower lid margin which was fastened to the eye-ball by epitheliomatous tissue. The cornea was on the point of perforating and he suffered agonies. I proposed to him the removal of the eye-ball with the whole conjunctival sac and the stitching together of the lids. He fully consented. The operation consisted of the removal of the epitheliomatous and as yet free parts of the margins of the lids and both canthi together with the eye-ball, and tarsal tissue and entire conjunctival sac in one. I had great difficulty in bringing the lid flaps together, especially on the nasal side, even after adding a small sliding flap from the bridge of the nose. Yet the healing was prompt and uneventful and no relapse occurred. Three years later the patient died from apoplexy, and whenever I saw him in the period of three years he expressed to me his gratitude and great satisfaction with the manner in which he had been operated on.

The freedom from continued secretion and irritation, from the unsightly empty orbital cavity, the fact that by covering the orbit new irritations and, perhaps, with them sources of relapses are definitely excluded, seem to make this mode of operating one which should be more frequently employed than as yet it seems to be. For most working people, it would seem to be much better than the wearing of an artificial eye even after simple enucleation.

ASEPSIS AND PROPHYLAXIS IN OPHTHALMOLOGY.

By PROF. PHOT. PANAS.*

Translated by Adolf Alt.

FOLLOWING the example of the general surgeons ophthalmologists have not been slow in recognizing that a new era was beginning, thanks to the immortal discoveries of Pasteur, concerning microbes and the practical applications which Lister has drawn from them.

If ophthalmologists hesitated at first, it was because the preparations of carbolic acid advised by Lister in the form of a spray, watery solution or as gas, did not suit the irritability of the eye and its adnexa. As soon as other antiseptic agents were substituted for carbolic acid, like 4 per cent. boric acid solution, solutions of mercuric salts, as biniodide of mercury 1:20,000, oxycyanide of mercury 1:1500, bichloride of mercury, 1:5000, or 2000 at most, or better still, distilled water sterilized by heat with an addition of a small quantity of chloride of sodium 5:1000, antisepsis found a definite place in operative ophthalmology.

We may state that since the Graeco-Roman epoch it has been known from clinical observation that it was necessary to precede operations concerning the conjunctiva and the lids by the washing of the eye and its adnexa. The fluids used were ocean salt water, ordinary salt water, rose water, decoction of grecian hay (*fenu grec*) with honey and hot honey water.

The Arabs, and especially Albucasis, recommended in the treatment of hypopyon, after the evacuation of the pus had been obtained through a large opening in the lower part of the cornea, an injection of warm honey water into the anterior chamber, or the decoction of grecian hay, just mentioned.

The use of warm water has been continued since, as may be seen by the fact that Saint-Yves recommended injections of warm water into the anterior chamber when the hypopyon or pus on account of its consistency does not flow out at the same time with the aqueous humor.

*At the same time with the notice of Prof. Panas' death the *Archives d'Ophthalmologie* (January, 1903), published this his last work on a subject to which he had given his especial attention. In the hopes of pleasing our readers it is translated in full.

In order to explain grave accidents and death supervening an operation, in the country as well as in the cities, in consequence of erysipelas and intercurrent pyaemia, it was necessary, before Pasteur, to introduce hypothetically some miasma, which might exist in the air, more particularly so at one time than at another, and the lack of sunlight, as is the case in large cities.

Since then the true cause, which is contagion, or in other words, the direct entry of pathogenic microbes, having been recognized and demonstrated, war against it has been made possible and fruitful.

That is what Lister has done as the first, by using chemical germicides, among which he preferred carbolic acid in solution or as gas, and adding to this, after the example of Chassaignac, the drainage of the wounds by means of perforated rubber tubes in order to obviate the accumulation of organic fluids which might disintegrate and might retard the healing by first intention. He also used other germicides, as boric acid and chloride of zinc, as he had found a good effect of these remedies in cases of ulcers and suppurating wounds.

Since then it has been found that dry heat as well as moist heat, as they can be obtained by boiling and steam, constitute potent means of defense, which, moreover, are not toxic and are well borne, as they do not irritate delicate tissues, like those of the eye and its adnexa. Only, it was wrong to look upon this as a method of defense, called *asepsis*, in opposition to that of Lister, called *antisepsis*. For it is well to remember that by either method we succeed less in killing the microbes than in rendering them inoffensive to the living tissues, which agrees with what has been found experimentally in the test-tube concerning all known antiseptics. We do not only find microbes in great numbers in phenic acid solutions, or mercuric solutions and other agents like iodoform, but these microbes which have ceased being noxious, may recuperate their virulence and again multiply when brought into a new culture medium which is favorable to them.

After this we think that the term *asepsis*, which is truer and more generic, should be preferred to that of *antisepsis*, and the two should not be used any longer in opposition to

each other; especially, since in many cases it is much easier and surer to attack the microbes with chemicals than with heat, as, for instance, when we have to deal with deep glandular follicles, like these of the free border of the lids, and with all natural orifices which in general are habitually infected by pathological secretion or excremental substances.

The skin of the lids and the surroundings of the orbit must have a special antiseptis, well applied. The reason for this lies in the fatty covering which reaches to a certain depth into the interior of the numerous sebaceous ducts with which they are supplied. This is especially the case with the free border of the lid where there are two rows of them, one in front at the roots of the cilia and one backwards where lie the orifices of the Meibomian glands. In order to sterilize such an area in which the microbes are, so to speak, covered with grease, we must begin by soaping the skin by means of a pledget of cotton, sterilized boiled water and soap. When this is done rub with dry cotton and make another friction with cotton very slightly moistened with ether. For the free border of the lids which, more than the other tissues, hide microbes within the orifices of the sebaceous ducts and those of the Meibomian glands, the best application is the vigorous rubbing with a pledget of sterilized cotton dipped in oleate of biniodide of mercury 4:1000, which is little irritating and an absolute bactericide, when it is allowed to act for several hours. To this end we prefer, with individuals who are to undergo a cataract extraction, to prepare this area in the evening before, to cover the closed eye with layers of gauze sterilized by heat and with a layer of borated gauze, and to apply over this layers of sterilized cotton and a bandage for fixation. All of this is to remain in place until the moment of operating has arrived.

Before proceeding with the operation the conjunctival sac way into the recesses of the tarsal fold is carefully washed out with a watery solution of mercuric salt, as mentioned above. The removal of the microbes and other impurities is not complete unless the lids are widely opened by means of a lid-holder and the fluid in the shape of a stream is forced under them from an appropriate instrument terminating in a nozzle. If there is the least suspicion of an infection of the

excretory lacrimal ducts, the washing out of these with an Anel syringe and the same mercuric fluid is to be practiced beforehand. Moreover, no operation must be performed on the eye without having treated the slightest form even of a dacryocystitis, and the same may be said about the neighboring cavities, as the nasopharynx, the different sinuses of the face, not to forget the maxillo-dental lesions, all of which may have some bad influence on an operated eye.

Schiötz, satisfied, as we are, of the importance of the antiseptics of the palpebral margin, proposes to epilate all the cilia, then to wash the skin with soap and a solution of sodium chloride 5:1000. However, so far he does not seem to have had any followers.

Needless to mention that every collyrium which is instilled into the eye before the operation must be perfectly aseptic and in condition to remain so for an indefinite period. Moreover, it must not be irritating, or as little as possible so, as this is unfortunately the case with every mercuric salt or any other germicide. Therefore, we are convinced that in this regard nothing surpasses the oily solutions of the alkaloids (cocaine, atropine, eserine, pilocarpine, etc.).

The most minute antiseptic precautions applied to the neighborhood of the field of operation constitute a condition which is indispensable for success. It is due to the neglect of this that grave post-operative complications arise, and that for a long time the absolute efficacy of antiseptics was doubted, and the bad results were put to the account of the bad state of the constitution of the patient.

We must insist that the operator and the assistants have surgically clean hands, and for this reason they must be washed with soap in sterilized water, brushed hard and dipped into a mercuric or phenic solution. All instruments, of whatever kind, must previously be immersed into boiling sterilized water to which has been added some bicarbonate of sodium, which prevents rusting. All objects used for bandaging, gauze compresses, silk threads, must be sterilized by steam of a temperature of 120 degrees for at least one-half hour, enclosed in nicked boxes, after which a current of hot air is passed through them in order to dry them, preferably after its having passed through a receptacle with sulphuric acid so

as to clean them of dust and microbes held in suspension. The cat-gut threads are continuously kept in a solution of benzonaphtol, chloroform or any other antiseptic solution. The absorbent cotton, whether in roll or pledgets, is sterilized in tin boxes or wire baskets in the sterilizer at a temperature of 150 degrees. In order to avoid having the assistants cut or manipulate something, it is best to have the pledgets and rolls of cotton, which may be used at any moment in the ophthalmic clinics, previously cut in the proper shape, enclose them into nicked boxes which are sterilized, as just mentioned, and which are kept always closed and from which the operator, or who applies the bandage, takes them without any intermediary. If an assistant hands them he must not touch them with his hands, but use a ring forceps which is just taken from boiling water.

I am in accord with those who, in conformity with the invariable precepts of general surgery, do not neglect to immobilize after the operation every cutaneous or corneal flap, as the only means to get a prompt cicatrization *per primam* and which permits, in cases of cutaneous or mucous membrane sutures, of removing the stitches after a very short time, three to five days at most; otherwise the stitches cut through the tissue and leave, for this very reason, ugly cicatricial bands. Rest and the immobility of the eyeball seem the more necessary to me, since here we have to deal with parts which are essentially mobile, even under a compressive bandage. Having given a spherical shape to the center of the region with a circular wall at the base, especially deep at the nasal canthus, the filling up with cotton pledgets must be done all over equally and uniformly. Therefore, we always interpose a little cotton ball of the size of a little almond in the hollow between the eye and the root of the nose between the gauze lying immediately on the closed eye and the cotton pledgets. Thus not only is the eyeball immobilized, even if it should undergo a spasm, but stronger pressure on the summit of the cornea is avoided, which would make the lips of the corneal flap gape when an operation for cataract has been made, whether with or without iridectomy, and in all cases may cause an alteration in the epithelium, which would not be indifferent should a post-operative infection arise from

the conjunctival cul-de-sacs, the ciliary border of the lids, or the lacrimo-nasal canal. Without this precaution we expose ourselves, furthermore, to a retardation of the primary reunion of the corneal flaps and in consequence of the re-establishment of the anterior chamber.

I am not unmindful of the fact that this occlusion has been accused of heating and irritating the conjunctiva and of multiplying the microbes because they are not swept away by the flow of the tears to which some try to vouchsafe germicidal properties. As far as I am concerned, I believe that closing the lids has no inconvenience, unless the conjunctiva is previously infected and inflamed, since no such thing occurs in an eye operated upon without previous infection, and what is true for the eyeball is even more so concerning the lids.

Concerning the bactericidal properties of the tears as maintained among others by Bach* and Valude, it has been absolutely denied by Ahlstrom† and Matkovic. The question therefore remains unsettled.

Aside from the operations we have to consider the accidental traumatisms of the eye as to prognosis and treatment.

Thanks to antiseptics, the treatment as well as the prognosis in these cases have enormously gained to the benefit of the patients.

Not long ago every eye gravely injured or suspected of harboring a foreign body was condemned to enucleation, which, as Warlomont and others insisted, had to be performed at once to prevent serious complications and the much dreaded sympathetic inflammation. Whenever inflammation and suppuration had invaded an injured eye the eye was enucleated.

In measure as we have progressed with the antiseptics of the injured eyes, the happy results of a conservative treatment have increased in numbers to such a point that to-day it is the base of all reasonable treatment and pursued with tenacity, whether we have to deal with an aseptic or an infected wound.

Out of 200 cases in my service at the Hôtel Dieu during

*Arch. f. Ophth., XXXIII.

†Centralbl. f. pr. Augenhk., 1895.

the last 10 years I was forced to perform exenteration 20 times on account of plastic and purulent iridocyclitis, and not once an enucleation. Thus the ball could be preserved as to its shape and serve for an excellent prosthesis. In a fifth of the cases the patients have left the hospital possessed of useful and even excellent vision. Among these latter I may cite the case of a deafmute painter of talent who had been struck into the eye, the cornea being ruptured in its whole horizontal meridian with expulsion of the lens, prolapse of the iris and a hyphæma, preventing examination of the interior. Moreover, this was the only good eye which permitted the patient to follow his profession, since the fellow eye was amblyopic since early childhood from a high degree of divergent strabismus. It is clear that on account of the deafmuteism in this case the enucleation of the injured eye had to be doubly rejected.

By means of an antiseptic treatment of which we shall speak later on, not only was this eye saved, but after three months the patient regained a visual acuity which permitted him to read, to write, and to paint as before, so that he became again useful to himself and his family.

Among the authors who are partisans of a conservative treatment I only want to cite O. Schirmer* who in a recent and exhaustive article gives a series of 133 cases of penetrating injuries of the eye, almost half of which were infected, that is complicated with iritis, iridocyclitis, a plastic or purulent, rarely, a serous hyalitis. Of these 62 cases, as far as the preservation of the globe counts, 60 per cent. of those that had fibrinous uveitis healed, 65 per cent. of those with purulent uveitis, and all three of the only three cases with serous uveitis. He made only eight immediate enucleations out of the 71 aseptic eyes, of these five in which the eyeball was burst, and two secondary enucleations of eyes having become atrophic with continued irritability, and one in which a piece of copper remained in the eye. In the cases complicated with plastic uveitis he enucleated five times, and four times in cases with purulent uveitis. To sum up, he made 17 enucleations in 133 cases. As other conservative means employed by him we may mention six optico-ciliary resections

*Grafe's Arch. 1901, LIII., p. 1-51.

on account of plastic uveitis, and three exenterations on account of suppuration.

Schürmer reports no case of sympathetic ophthalmia, and I can say the same of my 200 cases. In order to show the scarcity of sympathetic ophthalmia in our days I will add that in the last four years, among 24,000 patients recorded in my service at the Hôtel Dieu, there were but two cases of sympathetic ophthalmia, which came from the outside, one due to an injury, the other occasioned by an old irido-cyclitis with albugo of the fellow-eye. To persist in slaughtering eyes under the pretext of preventing a hypothetical, and extremely rare, sympathetic ophthalmia, means to cause a disastrous deformity for the patient and this even without safety from a consecutive sympathetic ophthalmia which may be caused by the mechanical irritation by the artificial eye and the tendency of the retrotarsal folds of becoming infected and of suppurating for a shorter or longer period.

In every injury to the eyeball the constant indication is antisepsis, be the wound recent and supposedly aseptic, or already infected. Of course, the earlier the patient is seen the greater the effect. A great many patients lose time, or are content to consult their physician before seeing a specialist who alone is in a position to use the therapeutic measures which he has always at hand and which he can apply to the best advantage on account of a long experience gained from similar cases. Forty-eight hours after the injury, everything may be changed for the worst on account of the lack of antisepsis.

Unless a foreign body is easily reached, like those lying in the corneal tissue or in the anterior chamber, or pieces of iron or steel which have penetrated deeper but which can be easily coaxed into the anterior chamber by a strong electro-magnet, it is best to abstain from an immediate attempt at extraction. In the same manner we must be chary later on of performing a surgical operation in order to improve vision, as we may reawake inflammatory complications when the eye has remained injected, irritable and, especially, when painful. In a general way, it is sufficient to wait for from 3 to 6 months, according to the gravity of the lesion. Prompt intervention is indicated only when on account of an injury to the lens,

there are glaucomatous symptoms which do not yield to miotics and other means usually employed in these cases, or when there is decided danger of a sympathetic ophthalmia. There was a time when every iris prolapse, large or small, was at once excised. To-day, thanks to antisepsis, it is better to abstain and to intervene only, if necessary, at a later period when the injury is well on the road to healing. As to a simple imprisonment of the iris between the wound lips, so much dreaded formerly, it is best not to touch it or to be satisfied to cauterize the little staphyloma with electro- or thermocautery.

Where there is a large scleral wound with a tendency to gape, or where there is loss of vitreous body, there is a real advantage gained by stitching it with very fine sterilized silk or catgut. According to the case, the needle may perforate the sclerotic and, if necessary, the cornea, or it may suffice to stitch the conjunctiva. This method exposes less to a further loss of vitreous body.

We shall not return to the lotions and other efforts previously spoken of to assure the perfect antisepsis of the eyeball and its adnexa when injured. We want, however, to say that in these cases we must further add strong germicidal agents, especially when an infection has taken place as shown by signs of inflammation, as deep injection, chemosis, spontaneous pains and pain on pressing the ciliary ring.

In such cases we use analgesics, as cocaine, atropine as collyria, subcutaneous temporal injections of morphine and moist hot applications; local bloodlettings, by means of leeches or cupping at the temple or behind the ear which, in order to be useful, must be abundant, no fewer than 2 or 4 leeches at the time, letting the blood flow well afterwards. After this it is best to keep the patient in the dark for 24 hours.

Among the local antiseptics we have been especially gratified with methylene blue and violet 6 B, which have no caustic effect and which, thanks to their diffusibility, may reach microbes and their toxins in the depth of the tissues. The solution is 2 in 1000. Another topic which we always combine with the preceding ones is iodoform as powder and as salve with vaseline 6 to 100. From the idea that no anti-

septic vehicle equals sterilized oil I have often used in cases of plastic and purulent irido-cyclitis a collyrium of sterilized olive oil 30 grammes, methylene violet 6 B grammes 0.06, iodoform 1.5 grammes. Shake the mixture before using and instill 2 to 3 drops into the conjunctival cul-de-sac morning and evening.

Cold evaporating applications and iced ones are rarely useful unless it be in purulent conjunctivitis, like that of the newly-born or in gonorrhœa in the adult. They are on the other hand absolutely contraindicated, as von Græfe has established, at first in diphtheritic conjunctivitis when the tissue of the conjunctiva is anæmic.

It goes without saying that in purulent conjunctivitis and dacryocystitis the caustic antiseptics like the aqueous solutions of silver nitrate and protargol have their place, as is universally acknowledged.

In plastic and suppurative processes in the eyeball, sub-conjunctival injections of chloride of sodium, mercuric salts in weak solution, trichloride of iodine and more recently methylene violet have been tried. The results have been varied and not always agreeing. This cannot be wondered at, as we do not as yet understand how so infinitesimal a quantity of the chemical agent as gets into the tissues and into the interior of the eyeball can act. In spite of this, there are cases in which the benefit is real, and we might easily explain it by some kind of revulsion due to the local irritation caused by the substance used. As there is no danger connected with their employment, we think they can be used when occasion offers.

A remedy which is more certain in its action under certain circumstances, as, for instance, suppuration of the cornea, whether this is an infected wound or an ulcer, is the red hot iron (thermo- or electro-cautery), which is heated to a dark red, not cherry red, which might attack the healthy parts in the neighborhood and cause more loss than necessary. In suppuration of the lacrimal sac nothing equals the extensive splitting of the anterior wall through skin and lateral internal ligament, followed by a copious antiseptic washing, the curetting of fungosities, if there are any, and the cauterization of the whole mucous membrane of the sac, together with the

opening into the nasal duct. After that, a drain of iodoform gauze is introduced and changed every day till all morbid secretion has ceased. When this operation is made at an early stage, when the skin is not stretched and atrophied, when there is no fistule, no deformity is left behind and all that remains is a flat linear scar, scarcely visible.

Lately Berger has proposed, when a panophthalmitis threatens, to introduce small quantities of iodoform into the eyeball in the hope of thus preventing the invasion of the vitreous body. Future experiences will have to show whether or not this is good practice.

Aside from the local antiseptics or modifiers, in cases of plastic or suppurative inflammations in the eye ball, we must not neglect the general treatment. This is the more necessary since in many cases we have to think of the influence which endo-infections, which occur more frequently than is thought, may have upon the eyeball.

Of all therapeutic agents none appears to me to be as active as mercury, since it possesses at the same time an antiseptic and an antiplastic virtue.

However, in order to act thus the mercurialization must be prompt, certain and intense. A large experience has shown me that real confidence can only be had in injections or inunctions of mercury, as the internal administration alone offers many chances, a real variability of action and often gives rise to morbid manifestations, consisting of derangement of the gastro-intestinal tract, losing of flesh and dystrophy, all attributable to the caustic action of the mercuric salts on the mucous membranes.

As inunctions expose more than the other methods to stomatitis and their therapeutic effect varies much in different subjects, as the skin is more or less penetrable and on account of other physical conditions which increase or retard the absorption of the resulting metallic vapors through the lungs, and which, as we have ascertained in a work in preparation, are of a quantity which can hardly be weighed, we give the preference with emphasis to the subcutaneous or intra-muscular injections of which those of an oily solution of biniodide of mercury 4:1000 have given us the best results with the least inconvenience to the patient. On the contrary,

by injecting one centimeter a day we have never seen a stomatitis, nor gastro-intestinal troubles, nor the least trace of albumen in the urine, while at the same time the patient took on flesh and color.

Otto Schirmer* does not only declare himself perfectly satisfied with mercury, which he gives first place in the treatment of infected wounds of the eyeball, but he gives his choice to the intra-muscular injections of biniodide of mercury in watery solution of 25 centigrammes with 2.5 grammes of iodide of potassium in 25 grammes of water. He injects a cubic centimetre, corresponding to one centigramme of the biniodide. He has found it to be absorbed rapidly and has convinced himself of the influence of the remedy on the inflammatory process after a very short time, not more than half a day. As he insists on saturating the system, he adds in the first three days of the treatment, mercurial inunctions to the injections, made with 4 grammes morning and evening in men, with 3 to 4 grammes in women, and 50 centigrammes to 1.5 grammes in children according to age. He also uses subconjunctival injections of bichloride of mercury, not as an antiseptic remedy but as a lymphagogue. He repeats the series of inunctions 3 or 4 times with diminished doses, taking care to avoid or combat the stomatitis and to sustain the strength of the patient by a substantial diet. As a complement he also recommends sweating by means of steam-baths.

I, myself, have seldom gone beyond one cubic centimeter or at most two per day of my oily solution of biniodide, each one containing four milligrammes, being convinced not only that this quantity is sufficient, but that in this way we are sure, as I said above, to produce no bad influence on the general condition of the patient.

When it became clear that more was needed I have usually added calomel by mouth which was so often employed in Mackenzie's time in the English school and has since been wrongly abandoned. I give to an adult at most 3 to 5 centigrammes per day, mixed with one gramme of powdered sugar in the form of four powders. This medicament is not only admirably absorbed, but acts also as a revulsive and intestinal antiseptic. We know what a pernicious rôle the digestive auto-

*Loco citato, p. 43.

infections play in the pathology of the eye as well as of other organs. It is certain that calomel alone has sufficed in certain cases of plastic uveitis, gummatous irido-cyclitis with hypopyon and of sympathetic ophthalmia, in arresting the progress of the disease. Yet, actually I recommend calomel only as an adjuvant and I say the same of inunctions of blue ointment which in its action is variable, reserving, as I said, first place to the intramuscular injections of biniodide of mercury in oily solution which I make with preference in the gluteal region.

I need not say that the serum-therapy constitutes a most efficacious therapy against every microbic infection, as has been proven in diphtheritic conjunctivitis. When we have to deal with streptococcus infection Marmoreck's serum can be used, to which we personally owe the cure of a double orbital trombophlebitis, due to a suppuration of the ear and the neighboring cervical ganglions in which the pus contained only streptococci.

Very recently Roemer, inspired by the antitoxic action of injections of the serum of rabbits in which had been caused a conjunctivitis by means of abrine*, has proposed the use of a pneumococcic serum† in the treatment of serpiginous ulcer of the cornea, which, as is known, is in most cases due to the pneumococcus alone or associated with other microbes.

To the subcutaneous serum injections instillations into the cul-de-sac should be added as it has been done with the abrinized serum by Calmette‡ & Delarde, and then by Calmette§ & Lapersonne.

For all cases of infection in which the serum-therapy is not in place, we should try to free the organism from the microbes and their toxines by the natural ways of excretion, the gastro-intestinal tract, the kidneys and the skin; hence the usefulness of purges, diuretics and diaphoretics, not to forget keeping the patient in pure air, the action of which on the tubercle bacillus need no longer be demonstrated, then tonics and reparatives.

Aside from their therapeutic value the antiseptics play a

*Arch. f. Ophth., 1901, LII., p. 72.

†Arch. f. Ophth., 1902.

‡Annales de l'institut Pasteur, 1896.

§Congres international de Médecine, Paris, 1900.

very important rôle in the prophylaxis and ocular hygiene which comes into play especially concerning damaged eyes, such as have been previously injured or have corneal opacities with or without staphyloma or those with chronic blepharo-conjunctivitis, habitual lacrimation from ectropium or catarrh of the sac. All of these conditions render the eye less resistant and favor the rapid increase of microbes in the cul-de-sacs and crypts of the conjunctiva, as well as, in the orifices of the numerous glandular ducts with which the free borders of the lids are supplied. Aside from washing out twice daily with boiled sterile water, we must add according to necessity boric acid, biborate of sodium, chloride of potassium, which has given me good results, and when there are traces of suppuration or only abundant mucoid secretions more potent modifying solutions, as the salts of zinc, lead and silver in weak concentration, not to forget permanganate of potassium, naphthol, and others.

In order to be active solutions must be used in abundance and should be made with cotton balls or, better, with a glass injector, which is directed into the cul-de-sacs while the lids are widely opened. The eye-baths, as yet frequently recommended, must be looked upon as insufficient and, moreover, they may carry an infection from one eye to the other.

As the most deleterious affections, like the blennorrhœa of the newly-born, the gonorrhœa and the secreting granular ophthalmia are due to a contagium, we must use all possible means to destroy this. This is the more necessary, as statistics show plainly that one third of the blind owe their blindness to these three sources, while the remainder are due to injuries of all sorts, deep-seated ophthalmias, glaucoma and atrophy of the optic nerve.

The blennorrhœa of the newly-born which in itself furnishes one-fifth of all the blind of all ages and of all origin, can be avoided if, before the confinement, the purulent vaginitis which is so frequent in pregnant women is treated by germicidal vaginal injections. Since a contamination is possible, in spite of this, during the passage of the fœtus through the valvo-vaginal canal, the eyes of the newly-born must be washed with antiseptic solutions, solutions of mercuric salts and instillations be made into the cul-de-sacs of a 1 or 2 per

cent. nitrate of silver collyrium as is the method of Cr  d  . This latter method which has proven very successful, has reduced blindness from blennorrh  a neonatorum from 8 and 10 per cent. as before antiseptis, to one-half per cent. Other agents have since been proposed but have been less favorable in their action.

In order to avoid all infection after the birth perfect cleanliness must be obtained, comprising the hands, all objects and linen for the toilet, for which it is better to substitute absorbent cotton to wash and wipe the eyes with.

Gonorrh  ic ophthalmia calls for the same minute precautions, and, what is more, the patients must never touch the eyes with the fingers without having brushed and washed them with soap whenever they have touched the genital organs as, for instance, when urinating and arranging the shirt which is but too often soiled with the gonorrh  ic discharge. The so-called metastatic purulent conjunctivitis is a very doubtful affair, whilst direct contagion of the eyes is the absolute rule. Therefore, we must instruct all those who take care of infants with blennorrh  a, or who live with a gonorrh  ic, that, since these affections may be transmitted from one individual to another, they must avoid all direct or indirect contact, being careful of the water, the hands, the linen and other toilet articles.

Supposing one eye has already been affected, it should be carefully covered with a watch-glass glued all around the orbit with Unna's paste, collodion cotton or any other non-irritant adhesive, for fear the other eye might also be infected from the first one. Luckily the second eye most frequently escapes infection or the infection is late and less virulent, which contrary to the blennorrh  a neonatorum, makes the occurrence of bilateral blindness less likely.

The contagiousity of granular conjunctivitis can not be doubted, but with this restriction, that contagion occurs chiefly during the acute stage of purulency when the disease should be attacked by all the hygienic and preservatory agencies mentioned above. Living in narrow, badly ventilated quarters and physiological misery, including lymphatism, are the incontestable conditions for its propagation. Low and moist habitations have been especially accused, since the dis-

ease is said to be much rarer and to disappear in high altitudes, as in Switzerland, which was cited as an example of the scarcity of this disease. Brusch of Algier, in a very exhaustive paper, read at the International Congress, 1900, and published in the *Arch. d'Opht.*, has shown that these conditions are not of the same importance in Algier and that uncleanness and contagion constitute the two principal factors in propagating granular conjunctivitis. We may add that what is true in Algier is the same in Egypt and certain parts of North America, as for instance in Illinois, which on that account is called little Egypt.

Frightened by the number of blind people which would be caused by a diffusion of the granular conjunctivitis, the Government of the United States, induced by Miles Standish* of Boston, takes prophylactic measures against the immigrants from the old continent by exacting from them a certificate of immunity both from the port of departure and of arrival. Since this measure has been introduced in June, 1899, the proportion of trachomatous individuals has been reduced almost one half, so that in New York and the other Eastern States it is 2.71 per cent. instead of 4.25 per cent., and 6.57 per cent in Illinois, where formerly it was 8.79 per cent.

In agreement with these figures, bilateral blindness from trachoma in the hospital of the blind at Jacksonville, Ill., is 9.9 per cent., while in the State of New York it is only 4.02 per cent.† We have to add to these figures, as Davies‡ has observed in an excellent paper, those who have lost one eye only, or whose vision has been rendered defective by pannus with trichiasis and entropium which may go on to xerophthalmia and symblepharon, not to forget staphyloma, or at least cause irregular astigmatism, and conditions which occur under the influence of future microbic infections, end in ulcers of the cornea, panophthalmitis or phthisis bulbi, and especially glaucoma absolutum. That is the reason for Wilder's§ statement that aside from gonorrhœa and atrophy of the optic nerve, trachoma causes more blindness than all other eye affections together.

*Massachusetts Medical Soc., 1897.

†L. Howe, xxviii, Report of the New York School for the Blind.

‡Post-Graduate. 19: 2. p. 538.

§Ophth. Record, Nov. 1901.

We all know how many victims were attacked by the importation of trachoma into Europe at the time of the wars of the first Empire in Egypt, so that the disease since then has been called the Egyptian ophthalmia or, after the Belgian ophthalmologists, military ophthalmia.

From this follows the necessity of the hygienic measure to inspect the workingmen in factories, the children in school and in the community, the recruits in the army, the prisoners, and domestics in general, in order to destroy at once each focus of infection, according to the principal that it is easier and more certain to prevent trachoma than to treat it, which is tedious and not always certain of cure.

Aside from the contagium of the microbes and their toxines, from a standpoint of the hygiene of the eyes we have still to consider the syphilitic and gonorrhoeic endo-infections, which are only too frequent and the bad action of which influences all parts of the ocular apparatus including the sensory optico-retinal part, the cause of a great many cases of blindness from atrophy, among which tabes holds first place, besides blindness from gumma and protracted inflammations of the uveal tract and the sensitive and motor paralyses.

It is well known how much the prophylaxis of these two avoidable affections and of the blindness caused by them at this period concerns the syphilographers, the hygienists and the sociologists. It is the physician's part to recognize the origin of the disease, to attack it at its base and as soon as possible with local and general therapeutic agents which should be as accessible as is possible to the patients, teaching them the dangers they run and which they inflict on others and on society, and for this reason certain social duties which they must not overlook, especially since the disease is transmitted from father and mother to the child.

We should say the same about the intoxications in certain trades, as by lead, carbon sulphide, etc., and those voluntary ones by alcohol and tobacco, all of which may be avoided by conforming with the advice of the physicians and hygienists. Here the ophthalmologist is also called upon to prevent and combat the blindness which may result.

A final source of more or less grave affections of the eyes which may lead to loss of vision, is the lack of protection

against insults of a physical nature from the outside, as light, intense heat, and cold; or of a mechanical nature, as mere dust in the air and up to small foreign bodies which may be pricking, cutting or contusing and the action of which may vary from a simple scratch to penetration and tearing of the eyeball.

All things being equal, the affections resulting therefrom in the eye are considerably aggravated if the wounding foreign body was previously infected, or when the conjunctiva and the lids harbor pathogenic microbes, and when the cornea of the eye concerned has lost its sensitiveness or is constantly exposed to the air on account of cicatricial ectropium, paralytic lagophthalmus or some form of exophthalmus.

The defense in similar cases lies in the recommendation of protecting means, like the habitual wearing of glass or metallic gauze spectacles, which every workman whose work exposes him should wear obligatorily. This should be insisted upon by his employers who are legally liable for his injuries.

Another recommendation is to at once seek the aid of a specialist who, acting sooner, may obtain a cure and prevent disaster, while when called upon later he may be unable to do so.

In fact we must be pervaded by the idea and must teach this to the public that the great weapon against injuries which we possess to-day, lies in an immediate and thorough antisepsis.

MEDICAL SOCIETIES.

PROCEEDINGS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.*

W. LANG, F.R.C.S., Senior Vice-President, in the Chair.

Thursday, January 29, 1902.

HYALINE BODIES AT THE OPTIC DISC.

MESSRS. A. STANFORD MORTON and J. HERBERT PARSONS read a paper upon hyaline bodies (*Drusenbildungen*) at the optic disc, with drawings and notes of two cases and lantern slides. Out of 42 cases in the literature, seven had retinitis pigmentosa, others were associated with injury, nervous disorders (from simple headache to chronic hydrocephalus and insanity), and chronic interstitial nephritis, but a large number of patients were normal, with normal vision. The condition usually commenced in early life, and was extremely chronic. In nearly all cases both eyes were affected, but often unequally. The prognosis was good. The pathological anatomy of the condition was discussed, and various allied conditions demonstrated. It was shown that *Drusen* were not ordinary colloid bodies, such as are found upon the choroid, though these too might occur near the disc. Exudates similar to the hyaline nodules might become metamorphosed into true bone, such as was frequently seen in the choroid in shrunken globes. The fate of exudates in the disc and in other parts of the eye, and its dependence upon environment, were discussed.

PRIMARY EXTRADURAL TUMORS OF OPTIC NERVE.

MR. J. HERBERT PARSONS read a paper on primary extradural tumors of the optic nerve, with clinical and pathological notes of a case illustrated by lantern slides. There were 18 cases on record as compared with 102 cases of primary intradural cases. The disease usually commenced before the age of 10 years, and the prominent symptom is exophthalmos, the protrusion being most marked in the axis of the orbit. The failure of vision was slow, slower than with intradural tumors,

*British Medical Journal.

and was accompanied by optic neuritis of the "choked disc" variety, to be followed by postneuritic atrophy. Later changes in the eye resulted from lagophthalmos. In no case was the globe invaded by the growth. Eight of the growths were undoubtedly endotheliomata, several having the characteristics of psammomata. The fibromatosis present in most cases was a feature of importance. The growths were slow and of relatively low malignancy, giving rise neither to glandular dissemination nor to metastasis. Considering this fact and that the point of danger was at the apex of the orbit, Krönlein's operation, with retention of the globe, was indicated wherever possible.

TUMOR OF THE OPTIC NERVE; KRÖNLEIN'S OPERATION.

MR. L. WERNER reported two cases of this condition and referred to another under the care of Mr. Swanzy.

The first, a woman of 45, noticed swelling of the inner canthus for one year before coming under observation. When seen the left eye was two centimetres in advance of the right and directed downwards; there was no pulsation or *bruit*, and though the eye was blind the patient was unaware of it. The eye was anaesthetic, tension normal, and there was marked optic atrophy seen through the clear media. Tumor of the optic nerve was diagnosed, and it, with the optic nerve, was removed by Krönlein's method, the eye being left in its place. A semicircular incision with the convexity forwards and extending to near the outer canthus was made exposing the outer wall of the orbit. The bone was removed as widely as possible by dividing it with a chisel at the external angular process of the frontal and just above the zygoma, extending the incision backwards to the spheno-maxillary fissure and turning the mass back with the soft parts. The tumor was then isolated and removed; there was a clear portion of optic nerve in front, but posteriorly the growth extended into the apex of the orbit and required removal piecemeal. There was some hæmorrhage, causing temporary protusion of the eyeball after replacement of the flap. No sutures were put in the periosteum and no drainage tube was inserted. The lids, which were temporarily attached, became œdematous, but on removing the dressing on the fifth day union was complete, and though anæsthesia of the globe persisted, the eye

assumed a normal appearance, and movements, except lateral, were free. The tumor, enclosed in the dural sheath, was an alveolar sarcoma; the grouped cells being arranged concentrically, suggested endothelioma. The second case was a girl of 11, whose eye for fourteen months had been prominent and divergent. The eye was removed with the growth, the inner aspect of the lid was scraped and the orbit cleared out. The growth proved to be a myxosarcoma surrounding the nerve which had entirely degenerated.

Krönlein performed this operation first in 1886 and published account in 1889. It was not difficult and had many advantages. The wedge of bone freed should be as large as possible, and the division of the outer orbital plate should be accomplished before completely freeing the anterior part to avoid splintering. The risk was practically *nil*; of 73 cases one only had died. The limitation of lateral movement was temporary only and in cases where the nerve was not involved sight might be preserved.

FORMATION OF BONE IN THE CHOROID.

DR. THOMAS SNOWBALL read a paper on the formation of bone in the choroid. Notes were given of a series of seven cases in which ossification had taken place in eyes that had become blind and shrunken as the result of old perforating injuries or long-standing inflammation with or without perforation. In the choroid a chronic inflammation with plastic exudation was set up, leading to degenerative changes in the various layers of this coat; the outer pigmented stroma became more or less fibrous, the inner layers, the chorio-capillaris, and membrane of Bruch were to a large extent replaced by fibrous tissue which had become organized from the exudation poured out towards the inner surface of the choroid. In this fibrous tissue the bone had developed. At the areas of bone formation the chorio-capillaris when present was never a continuous layer, but was represented by only a few vessels here and there. The lamina vitrea, when seen, near the focus of bone, was never found external to it. This was contrary to the observations of Brailey, Fontan, and others, who described cases where the membrane of Bruch was seen as a distinct line external to the plate of bone. In most of his own cases the bone formed a layer in the usual situation.

namely, around the optic nerve entrance. In one case where colloid bodies were undergoing ossification, the bone in the choroid had evidently arisen independently of them, and was a more advanced stage of development. In none of the cases was there a trace of sympathetic disease in the other eye. From a study of his own cases and those described by Knapp, Whiting, Legrange, and many others, it was concluded that ossification in the choroid arose most commonly in fibrous tissue developing in the chorio-capillaris, and either replacing it or lying immediately external to it.

CARD SPECIMENS.

The following were shown: Mr. L. Werner: Coloboma of the optic nerve.—Mr. F. A. C. Tyrrell: Congenital malformation of the lower eyelids.—Major M. T. Yarr, R. A. M. C.: Changes in the macular region following contusion of the eye.—Mr. E. Treacher Collins: A case of favus of the upper eyelid.—Mr. Holmes Spicer: Sections from naevus of the orbit.—Mr. J. H. Fisher: Aneurysmal dilatation of the retinal vessels in a boy suffering from heart disease.

ABSTRACTS FROM MEDICAL LITERATURE.

BY W. A. SHOEMAKER, M.D.
ST. LOUIS, MO.

THE DECENTERING OF LENSES FOR NEAR WORK.

G. C. Savage (*Journal American Medical Association*, Nov. 22, 1902), thinks that very good results can be obtained from the proper decentering of lenses; providing the prismatic effect is not too great. The maximum vertical prismatic effect should be placed at 1 to 2 degrees and the lateral at 2 to 4 degrees. In the majority of cases the prismatic effect should correct about one-half of the manifest error. The full correction, especially of a small vertical error, is at times worn with comfort. The objection to prisms is, that it frequently interferes with the "visual judgments," and for this reason the author thinks that it is better to cure muscle errors of low degree by proper prismatic exercise; those of high

degree should be treated surgically. He submits the following rules:

1. If there is orthophoria, presbyopic lenses should be properly centered, that is, they should be so placed that each visual axis will cut the optical center of its lens, when a point of fixation is in the extended median plane of the head. On changing the point of view in any direction, without moving the head, the prismatic effect would be the same in kind for each eye, and if the lenses are of equal strength, the degree of prismatic effect would be the same for each eye. The lenses for such eyes should never be so placed that both visual axes would cut them on either the nasal or temporal sides of the optical centers. With safety, and in some cases with positive helpfulness, the lenses may be so placed that the visual axes would cut them directly above the optical centers. As can be readily seen, this would take some work off the subvertor muscles, thus lessening the demand on the second and sixth conjugate brain centers. But orthoptic eyes will not take kindly to presbyopic lenses placed so high that the visual axes would cut them below the optical centers, for this would create an abnormally large demand on the two centers mentioned.

2. If there is uncomplicated esophoria, both presbyopic lenses should be decentered directly out, and to an equal extent, so that the two visual axes may cut the lenses to the nasal side of their optical centers, thus favoring the weak externi. This can be accomplished equally as well by making the frames wider than called for by the pupillary measurement. If the interni are properly attached, the compensating esotropia will be attended by relief, but if attached too low the compensating esotropia would develop a plus cyclophoria that might bring great discomfort. To decenter lenses in, or to have the frames narrower than called for by the pupillary measurements, for such eyes, would render the lenses more or less unbearable.

3. In esophoria complicated only by hyperphoria of one eye and cataphoria of the other, the decentering of presbyopic lenses should be confined to the lens for the hyperphoric eye, and should be down-and-out, so as to develop a compensating eso-hypertropia of this eye. To decenter the lens out-and-up

for the cataphoric eye would result in developing a plus cyclophoria, to correct which the superior oblique would be forced into a state of abnormal tension. Slight abnormal tension is well borne by the inferior oblique, but not by the superior oblique.

4. In esophoria, complicated by hyperphoria of one eye and cataphoria of the other, with plus cyclophoria, the decentring of presbyopic lenses should be confined strictly to the lens for the hyperphoric eye, and should be down-and-out, so as to develop a compensating eso-hypertropia. The rotation in-and-up, made necessary by the prism displacement, generates a minus cyclophoria which, in such a case, would neutralize the existing plus cyclophoria, thus enabling the superior oblique to easily parallel the vertical axis of the eye with the median plane of the head. In such a case the evil effect of decentering the lens out-and-up, for the cataphoric eye, comes from the compensating eso-catatropia, and is due to the plus cyclophoria that is thus generated. There being already a plus cyclophoria which the superior oblique must correct by being kept in a state of abnormal tension, the added artificial cyclophoria can do nothing but augment the discomfort of the patient.

5. In simple exophoria each presbyopic lens should be decentered directly in and to an equal extent, or what would be the same in effect, the frames should be made narrower than would be indicated by the pupillary measurement. This would develop a compensating exotropia, and the lenses would be well borne if the externi have ideal insertions or if their insertions are lower than normal; but if their insertions are higher than normal the lenses thus decentered would not be well borne for the reason that the compensating exotropia would develop a plus cyclophoria. Presbyopic lenses, in frames that are wider than indicated by the pupillary measurement, can not be borne by an exophoric.

6. In exophoria complicated by hyperphoria of one eye and cataphoria of the other, the decentering of presbyopic lenses should be confined to the one for the cataphoric eye, and should be in-and-up. This would develop a compensating exo-catatropia; that is, the eye would be rotated out-and-down. Every such rotation of an eye develops a minus

cyclophoria which the inferior oblique can correct easily. Decentering the lens in-and-down, for the hyperphoric eye, would cause a compensating rotation out-and-up, which would develop a plus cyclophoria, the correction of which would not be easily borne by the superior oblique.

7. In exophoria complicated by hyperphoria of one eye and cataphoria of the other, with plus cyclophoria, the decentering of the presbyopic lenses should be confined strictly to the one for the cataphoric eye, and should be in-and-up. The compensating exo-cataptropia, that is, the rotation out-and-down, would develop a minus cyclophoria which would more or less completely neutralize the existing plus cyclophoria. To decenter the lens for the hyperphoric eye in-and-down would cause a compensating exo-hypertropia, that is, a rotation out-and-up. This would develop artificially a plus cyclophoria which, grafted onto the plus cyclophoria already existing, would only add to the discomfort of the sufferer.

8. In hyperphoria of one eye and cataphoria of the other, with or without plus cyclophoria, the decentering of presbyopic lenses should be confined to the one for the hyperphoric eye, and should be directly down. There would be caused a compensating hypertropia. This would develop a minus cyclophoria which the inferior oblique would counteract readily. To decenter the lens directly up for the cataphoric eye would cause a compensating cataptropia which would develop a plus cyclophoria not easily correctible by the superior oblique. The trouble with such a lens would be emphasized if the artificial plus cyclophoria should be grafted onto an existing plus cyclophoria.

9. In double hyperphoria uncomplicated, both presbyopic lenses should be decentered directly down, and to an equal extent; or, what would be the same in effect, the nose-bridge should be made deep enough to allow the visual axes to cut the lenses above their optical centers.

10. In double cataphoria uncomplicated, if any decentering should be done at all, it should be directly up.

11. If there is plus cyclophoria only, in a presbyopic case, both correcting lenses should be decentered down.